Upgrading Routers from Version 5 to Version 10.0

Router Software Version 10.0
Site Manager Software Version 4.0

Part No. 112938 Rev. A
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Bay Networks

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About This Guide

If you are responsible for upgrading Bay Networks™ Router Software Version 5 to Router Software Version 10.0 and Site Manager Version 4.0, read this guide for

- Upgrade prerequisites and initial preparations (Chapter 1)
- Instructions for copying files to your Site Manager workstation or PC (Chapter 2 for PC users; Chapter 3 for UNIX users)
- Instructions for converting and customizing files on your workstation or PC (Chapter 4)
- Instructions for transferring converted and customized files from your Site Manager workstation or PC to the router and testing these files (Chapter 5)
- Instructions for converting Version 5 traffic filters to Version 10.0 and sample traffic filter conversions (Appendix A)
- Version 5 and Version 10.0 interoperability issues (Appendix B)

Each chapter in the guide represents one phase of the upgrade process. You complete each upgrade phase by accomplishing a set of goals or tasks. Complete each task by following its subordinate procedure and numbered steps.

Audience

Written for system and network managers, this guide assumes that

- You have a working knowledge of Bay Networks router software, Site Manager, and the Technician Interface.
- You have experience managing and configuring Bay Networks routers.

Before You Begin

Before using this guide, you must complete the following procedures:

- Ensure that your router is currently running Bay Networks Version 5 router software. Also, be sure you are running Bay Networks Site Manager Version 1.*xx* or later.
- Ensure that the workstation or PC on which you plan to install Site Manager is configured according to the requirements outlined in *Quick-Starting Routers and BNX Platforms*.
- Ensure that the router you want to upgrade meets Version 10.0 hardware and Flash free-space prerequisites. If you need help meeting the prerequisites, contact the Bay Networks Technical Response Center in your area.

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Valbonne, France	(33) 92-966-968
Sydney, Australia	(61) 2-903-5800
Tokyo, Japan	(81) 3-328-005

Conventions

angle brackets (< >)	Indicate that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: if command syntax is **ping** *<ip_address>*, you enter **ping 192.32.10.12**
arrow character (➔)	Separates menu and option names in instructions. Example: Protocols➔AppleTalk identifies the AppleTalk option in the Protocols menu.
bold text	Indicates text that you need to enter and command names in text. Example: Use the **dinfo** command.
brackets ([ ])	Indicate optional elements. You can choose none, one, or all of the options.
italic text	Indicates variable values in command syntax descriptions, new terms, file and directory names, and book titles.
quotation marks (“ ”)	Indicate the title of a chapter or section within a book.
`screen text`	Indicates data that appears on the screen. Example: `Set Bay Networks Trap Monitor Filters`
ellipsis points	Horizontal (. . .) and vertical (⋮) ellipsis points indicate omitted information.
vertical line (|)	Indicates that you enter only one of the parts of the command. The vertical line separates choices. Do not type the vertical line when entering the command. Example: If the command syntax is **show at routes** | **nets**, you enter either **show at routes** or **show at nets**, but not both.

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Acronyms

AFN	Access Feeder Node
ALN	Access Link Node
BOOTP	Bootstrap Protocol
CN	Concentrator Node
CPU	Central Processing Unit
CSMA/CA	Carrier Sense Multiple Access with Collision Avoidance
FN	Feeder Node
FTP	File Transfer Protocol
HDLC	High-Level Data Link Control
HSSI	high-speed serial interface
IP	Internet Protocol
IPX	Internet Packet Exchange
LAN	local area network
LN	Line Node
MAC	media access control
MIB	Management Information Base
NCL	Network Control Language
OSPF	Open Shortest Path First
PPP	Point-to-Point Protocol
PPX	Parallel Packet Express
PROM	Programmable Read-Only Memory
RAM	random-access memory

RIP	Routing Information Protocol
SIMM	Single In-Line Memory Module
SMDS	Switched Multimegabit Data Service
TCP/IP	Transmission Control Protocol/Internet Protocol
TFTP	Trivial File Transfer Protocol
VME	Versa Module Euro

Chapter 1
Preparing to Upgrade

This chapter describes upgrade prerequisites and initial preparations for upgrading routers running Version 5 software to Router Software Version 10.0 and Site Manager Software Version 4.0.

The procedure for upgrading routers from Version 5 to Version 10.0 consists of a series of high-level tasks, each representing one phase of the upgrade process. You complete each upgrade phase by accomplishing a set of goals or tasks. Complete each task by following its subordinate procedure and numbered steps.

The router upgrade procedure applies to the following routers:

- AFN®
- ALN
- FN™
- LN®
- CN®

Router Upgrade Prerequisites

Do not begin this router software upgrade process until you verify that the router meets the prerequisites described in this chapter for

- Minimum hardware
- Contiguous free space on a Flash volume
- Boot PROM version

Note: *If you need help meeting the prerequisites of the Version 10.0 router software upgrade procedure as described in this section, contact the Bay Networks Technical Response Center in your area.*

Minimum Hardware Requirements

Before you upgrade an AFN, ALN, FN, LN, or CN router to Router Software Version 10.0, perform the following steps to ensure that the router meets all minimum hardware configuration and revision level requirements:

1. **Ensure that the VME router you want to upgrade contains a Flash memory controller and a Flash card.**

   To determine whether your VME router contains a Flash memory controller, look at Slot 1 in the router module. The Flash memory controller resides in this slot.

   Version 10.0 router software runs on Flash media only.

Note: *The PCMCIA/Floppy switch on a SYSCON-II Flash controller should be in the Floppy position, with the router running Version 5.*x *software.*

2. **Complete any planned (optional) upgrade from 2-MB Flash to 4-MB Flash support on a router.**

   This procedure includes a Boot PROM upgrade for a Flash controller module.

3. **Determine whether any other new router hardware requires software or PROM upgrades to work properly.**

Contiguous Free Space on a Flash Volume

You must determine the amount of free space that you need on the Flash card to accommodate the customized Version 10.0 router software image and configuration files. The amount of contiguous free space available on the target Flash volume must be greater than the combined size of the customized Version 10.0 router software image and associated files (such as *config*, *ti.cfg*, and, if appropriate, a Version 10.0 PROM image).

After you first boot the Flash card that contains the default *config* file, you can determine the amount of contiguous free space available in a selected volume by entering the **dinfo** command. The **dinfo** command displays the data shown in Table 1-1.

Table 1-1. Determining Available and Contiguous Free Space on Flash Card

Field	Meaning
Total Size	Total number of bytes (used and unused) on the volume.
Available Free Space	Number of unused bytes on the volume.
Contiguous Free Space	Number of unused bytes in the largest block available on the volume. This space is actual usable memory.

Boot PROM Version

Starting with Version 8.10 of the router software, Bay Networks implemented a new naming convention for router software image files in AN™, AFN (with Flash), ASN™, and BN® routers. The Version 10.0 router software image name for FN, ALN, LN, and CN routers remains *ace.out*.

The new naming convention provides the following benefits:

- Simplifies how you manage router software image files on your Site Manager workstation, beginning with Version 8.10.
- Reduces the complexity of performing future upgrades in a network containing different routers.

Upgrade the Boot PROM in the router when you want to implement the new naming convention and any new features that depend on the newest version of the Boot PROM program.

Note: *Bay Networks strongly recommends that you upgrade the Boot and Diagnostic PROMs in an AFN (Flash) router before upgrading the router's software image to Version 10.0. The Version 10.0 software requires a Version 3.04 Boot/Diagnostic PROM in the AFN.*

The Boot PROM program in CN, FN, LN, and ALN (VME) routers looks only for the router software image name *ace.out* at system boot time. It is not necessary to upgrade the Boot PROM in any of these VME routers unless you are also upgrading that router from 2-MB Flash to 4-MB Flash support. (The router requires Version 8.10 or later Boot PROM code to support the 4-MB Flash card.) You upgrade the Boot PROM on a SYSCON-II Flash controller for FN, ALN, LN, and CN routers using the Technician Interface.

Before Version 8.10, the Boot program in AFN routers (with Flash) looked only for the software image name *boot.exe.* Once updated for Version 8.10, the Boot and Diagnostic PROMs in an AFN (with Flash) look first for the Version 8.10 or later router software image name *afn.exe* at system boot time. If the Boot program cannot find *afn.exe*, it searches next for the Version 7–8.0*x* image name, *boot.exe*.

For instructions about upgrading PROMs on the AFN, ALN, CN, FN, and LN routers, refer to the sources listed in Table 1-2.

Table 1-2. PROM Upgrade References

When Upgrading PROMs on Router	Refer to
AFN (Flash)	*Installing a Flash Memory Upgrade in an Access Feeder Node*. (This document comes with the AFN Flash upgrade kit.) To continue with the Version 10.0/4.0 upgrade process, go to "Initial Upgrade Preparations," following this section.
FN, ALN, LN, or CN	"Router Upgrade Prerequisites," unless you want to first upgrade the router from 2-MB Flash to 4-MB Flash support. If so, refer to *Upgrading SYSCON -II Boot PROMs for 4-MB Flash Cards,* supplied with your 4-MB Flash upgrade kit.

Note: *If you recently installed in the AFN a Flash card containing an image that is Version 8.10, the AFN already has the Boot and Diagnostic PROMs that look for the router software image name* afn.exe*. However, you may need to convert and upgrade Version 5.xx configuration files still residing on the AFN to Version 10.0. If so, go to Chapter 4 to transfer files to the workstation for conversion. If you created new (Version 8.10 or later) configuration files for the AFN using Site Manager, go instead to Chapter 5 to complete the upgrade for an AFN.*

Initial Upgrade Preparations

Before you can upgrade your router from Version 5 to Version 10.0, you must complete the following tasks:

- Satisfy startup requirements
- Inspect your upgrade kit
- Connect an ASCII console to the router
- Verify X.25 certifiability (configuration-dependent)
- Review interoperability issues

This section describes each task in greater detail.

Satisfying Startup Requirements

Before you attempt the Version 5 to Version 10.0 upgrade procedure, ensure that

- Your router is currently running Bay Networks Version 5 router software.
- You know the hardware configuration of the router you want to upgrade (router model, link modules, and slot assignments for link modules).

Note: *Later in the upgrade procedure, you must enter the router's hardware configuration in each of the upgraded configuration files.*

- You know how to back up the Version 5 router software and files.
- You have a working knowledge of the operating system and the windowing software on the UNIX workstation or PC you will use to run Site Manager software.
- You have a 4-MB Flash card on which to store the Version 10.0 router software image and associated files. A 2-MB Flash card will no longer accommodate the Version 10.0 router software image and associated files.
- You have considered minimum hardware revisions (for example, a link module with hot-swap capability may require a hardware revision for Version 10.0).
- You have considered your memory requirements carefully. Based on the number of protocols installed on your router, you may require additional memory to run these protocols.

  If you have questions regarding memory requirements, contact the Bay Networks Technical Response Center in your area.
- You have read these Bay Networks publications:
  - *Read Me First* (Version 10.0)
  - *Release Notes for Router Software Version 10.0*
  - *Release Notes for Site Manager Software Version 4.0*
  - *Known Anomalies (*Version 10.0*)*

- You have available these Bay Networks Version 10.0 publications:
  - *Quick-Starting Routers and BNX Platforms*
  - *Modifying Software Images for Routers*
  - *Using Site Manager Software*
  - *Using Technician Interface Software*
  - *Configuring Routers*
  - *Managing Routers and BNX Platforms*
  - *Configuring Traffic Filters and Protocol Prioritization*

Contact your Bay Networks sales representative if

- You do not have the guides listed in this section
- You want additional copies of any guide in the Version 10.0 document set

If you will be running Site Manager Version 4.0 on a Windows/DOS PC, you should have available user documentation for your WinSock-compatible TCP/IP stack software. (If you are using Distinct TCP/IP Version 3.31 to support Site Manager Version 4.0, have available the *Distinct TCP/IP for Microsoft Windows* manual.)

Inspecting Your Upgrade Kit

Check your upgrade kit to ensure that it contains the Router Software Version 10.0 and Site Manager Version 4.0 upgrade components listed in Table 1-3.

Table 1-3. Router Software and Site Manager Software Upgrade Components

Component	Software Storage Media and Printed Media	Management Platform
Router Software Version 10.0 includes • Platform-specific Router Software image files • Platform-specific Boot and Diagnostic image files • configuration file (*config*) • debug.al file • install.bat file • ti.cfg file • ti_asn.cfg file (for ASN router only) Site Manager Software Version 4.0 includes • Technician Interface Scripts • Distinct TCP/IP Version 3.31 for Site Manager*	CD-ROM on High Sierra file format	UNIX workstation or Windows/DOS PC
Version 10.0 online documentation library	CD-ROM on High Sierra file format	UNIX workstation or Windows/DOS PC
Version 10.0 upgrade documentation: • Router upgrade documents (Version 5–10.0 and Version 7–9.*xx* to 10.0) • Site Manager Release Notes • Router Software Release Notes • Read Me First (if available) • Known Anomalies • *Implementing BayRS Version10.0 in a Bay Networks Router Environment*	Printed media	UNIX workstation or Windows/DOS PC
Distinct TCP/IP for Microsoft Windows Run TIme Installation and Configuration Guide	Printed media	UNIX workstation or Windows/DOS PC

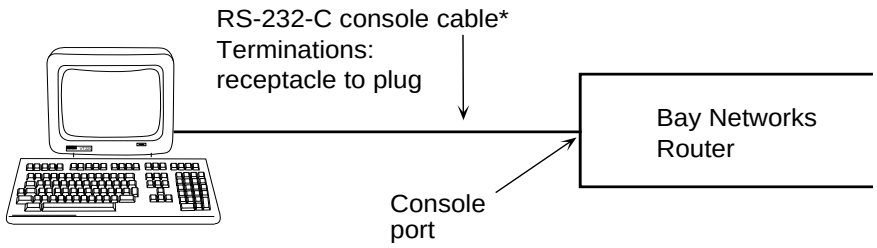
* Distinct TCP/IP Version 3.31 is a Windows Sockets (WinSock) compatible TCP/IP application program that ships with Site Manager 4.0. Site Manager uses Distinct TCP/IP software to communicate with Bay Networks routers.

Connecting an ASCII Console to the Router

You use a standard ASCII console or an ASCII terminal emulation program on a PC or UNIX workstation to manage certain aspects of the router upgrade process. ASCII terminal connections you established to run a Version 5.*xx* router also run a Version 10.0 router.

Connecting an ASCII Terminal Device to the Router's Console Port

Figure 1-1 shows how to connect an ASCII terminal device directly to the router's console port. This connection supports local logon to the router's Technician Interface.

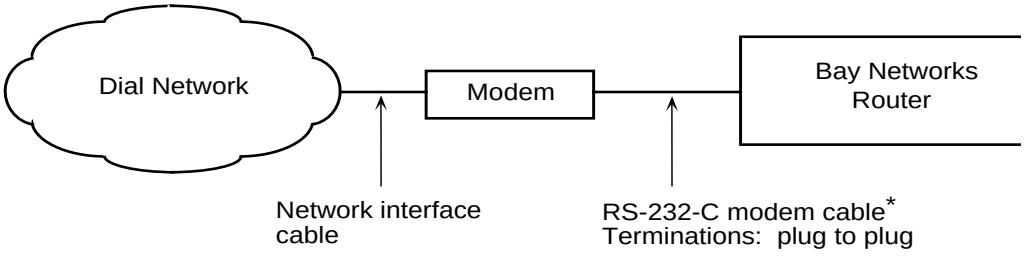


Use Cable No. 7525 for FN, ALN, LN, and CN routers.
Use Cable No. 7526 only for AFN routers.

Figure 1-1. ASCII Terminal Device Connected to the Router Console Port

Connecting a Router to the Network through a Modem

Figure 1-2 shows how to connect a router to the dial network through a Hayes-compatible modem. With this configuration, you log on to the router's Technician Interface from a remote PC or UNIX workstation. (You configure the PC or UNIX workstation with an ASCII terminal emulation program and a connection to the dial network through another Hayes-compatible modem.)



* Use Cable No. 7825 for AFN, FN, ALN, LN, and CN routers.

Figure 1-2. Modem Connected to the Router Console Port

Verifying X.25 Certifiability

If the router you want to upgrade does not currently support any X.25 configurations, go to "Reviewing Interoperability Issues."

If you need to upgrade a Version 5 router supporting X.25 to a Version 10.0 router supporting X.25, read this section.

Due to possible differences between older and newer link modules supporting connections to your X.25 network, you must verify that a Version 5 router you want to upgrade to Version 10.0 can meet X.25 certification requirements. If you have not done so before receiving this upgrade kit, you may need to replace some link modules so that the router passes X.25 certification.

Refer to Appendix B for information on the hardware you need to ensure that the routers you are upgrading meet X.25 certification requirements upon completion of the upgrade.

Reviewing Interoperability Issues

Before you upgrade from Version 5 to Version 10.0, review the following interoperability issues between Version 5 and Version 10.0 routers:

- Point-to-point connections over a synchronous line
- PPP software
- AppleTalk OUI values for routing over SMDS or Frame Relay

Note: *You do not need to remove features unsupported in Version 10.0 from a Version 5 configuration file.*

Refer to Appendix B for more detailed information about these issues, then go to Chapter 2 or 3 to begin the router upgrade process.

Chapter 2
Starting the Upgrade: Copying Files to Your Personal Computer

This chapter describes how to install or copy the following files to a personal computer (PC):

- Site Manager Version 4.0 files
- Router Software Version 10.0 files
- Version 5 router files

For instructions on how to copy these files to a UNIX Site Manager workstation, go to Chapter 3.

Task 1: Installing the Site Manager Software

Follow the instructions provided in *Quick-Starting Routers and BNX Platforms* to install your Version 4.0 Site Manager software and Distinct 3.31 TCP/IP software on a PC.

Site Manager on the PC uses a Windows Socket-compatible TCP/IP stack to communicate across the IP network. Before you can upgrade Site Manager 4.0 on your PC, you must first upgrade the TCP/IP stack on that PC. Site Manager ships with the Distinct TCP/IP for Microsoft Windows software, Version 3.31, a Distinct Corporation application. Distinct TCP/IP provides an interface between Site Manager and the TCP/IP network. Earlier versions of Distinct TCP/IP will not work with Site Manager 4.0 for the PC.

If you use another Windows Socket-compatible TCP/IP stack to support Site Manager, refer to the user documentation supplied by the manufacturer of the TCP/IP stack for installation instructions.

Task 2: Installing the Router Software

Follow the instructions provided in *Modifying Software Images for Routers* to install Version 10.0 router software on a Site Manager PC.

Task 3: Backing Up Version 5 Files from Router to PC

Bay Networks recommends that you back up to your PC the software image and *config* files currently stored on the router. It is important to maintain backup copies of these files to ensure that you can restore router operation in case you encounter malfunctions during the upgrade process.

You back up Version 5 files to your Site Manager PC via diskette or via the IP network. (In Chapter 4, you use the backup copy of your Version 5 router configuration file as the source for the conversion utility *convert.exe*.) Choose the file backup or transfer method most appropriate for your requirements.

Transferring Files via Diskette

You can physically transport the router diskette with Version 5 configuration files to your Site Manager PC, then copy the files to the local hard drive. Perform the following steps:

1. **Enter the following Network Control Language (NCL) command at the operator's console of the router you want to upgrade:**

   remove

2. **Remove the diskette from the diskette drive of the router.**
3. **Insert the router diskette into the diskette drive of the PC.**
4. **Copy all files from the router diskette to the desired directory on your PC hard drive using MS-DOS commands or the Windows File Manager.**

   For example, copy the files to the *\wf\v580backup* directory, where *v580* is the version of your router software.

5. **Remove the router diskette from the PC's diskette drive.**
6. **Reinsert the diskette into the router's diskette drive.**
7. **Enter the following NCL command at the router operator's console:**

   insert

When you finish transferring files from the router to your PC, go to Chapter 4.

Transferring Files via the Network

You can transfer (back up) Version 5 files from the router to your Site Manager PC via your IP network using a TFTP-capable application program running on your PC. When you use the TFTP-capable program, be sure to

- Use the IP address of your router as the host address for the TFTP operation.
- Copy all the files (including those within directories) from the router diskette volume to the desired directory on your PC hard drive using binary-mode GET file operations.

  For example, transfer the files to the *\wf\v580.bkp* directory, where *v580* is the version of your router software.

For instructions on how to perform a TFTP binary-mode GET file operation from your Site Manager PC, refer to the user documentation supplied by the manufacturer of your TFTP-capable software.

Table 2-1 lists the Version 5 files you must transfer (back up) from the router's default file system volume to your PC.

Table 2-1. Version 5 Files to Transfer to the PC

At root level	In the /help directory	
ace.out	*atstat.hlp*	*ipxstat.hlp*
config	*bufstat.hlp*	*lbstat.hlp*
dmap.out	*cirstat.hlp*	*ncl.hlp*
/help	*conf.hlp*	*stats.hlp*
log	*dnstat.hlp*	*system.hlp*
netboot.out	*eventlog.hlp*	*t1stat.hlp*
vrtx.out	*ipstat.hlp*	*xrxstat.hlp*

When you finish backing up your Version 5 files, go to Chapter 4 to upgrade your Version 5 files (*config* and router software image) for use with the Version 10.0 router software.

Chapter 3
Starting the Upgrade: Copying Files to Your UNIX Workstation

This chapter describes how to install or copy the following files to a UNIX workstation:

- Site Manager Version 4.0 files
- Router Software Version 10.0 files
- Version 5 router files

For instructions on how to copy these files to a PC, refer to Chapter 2.

Task 1: Installing the Site Manager Software

To install Version 4.0 Site Manager software on a UNIX workstation, follow the instructions provided in *Quick-Starting Routers and BNX Platforms.*

Task 2: Installing the Router Software

To install your Version 10.0 router software on your Site Manager workstation, follow the instructions provided in *Modifying Software Images for Routers.*

Task 3: Backing Up Version 5 Files from Router to Workstation

Bay Networks recommends that you back up to your workstation the software image and *config* files currently stored on the router. It is important to maintain backup copies of these files to ensure that you can restore router operation in case you encounter malfunctions during the upgrade process.

Back up your Version 5 files via diskette or via the IP network to your Site Manager workstation. (In Chapter 4, you use the backup copy of your Version 5 router configuration file as the source for the conversion utility, *convert.exe*.) Choose the file backup or transfer method most appropriate for your requirements and workstation type.

Transferring Files to a Workstation

Table 3-1 describes how to transfer Version 5 files to workstations.

Table 3-1. Transferring Files to a Workstation

For this workstation type	Follow these instructions
UNIX workstation with 3 1/2-inch disk drive that can read DOS diskettes under the personal computer file system (pcfs)	Physically transfer your Version 5 files to that workstation via router diskette. For this procedure, go to "Transferring Configuration Files to a Sun SPARCstation via Diskette."
IBM RS/6000 and HP 9000 without 3 1/2-inch disk drive	Use TFTP to transfer your Version 5 files to the workstation via your IP network. For this procedure, go to "Transferring Files via the Network," at the end of this chapter.

Transferring Configuration Files to a Sun SPARCstation via Diskette

To transfer your Version 5 files to the local hard drive of your Sun SPARCstation:

1. **Enter this NCL command at the operator's console of the router you want to update:**

   remove

2. **Remove the diskette from the diskette drive of the router.**
3. **Insert the diskette into the diskette drive of the SPARCstation.**
4. **Get superuser privileges by entering this command at the UNIX prompt:**

   su

5. **Create a directory for your Version 5 files.**

   For example, enter this command at the UNIX prompt, where *v580* is the version number of your router software:

   mkdir /usr/wf/v580backup

6. **Mount the SPARCstation pcfs by entering this command:**

   mount -t pcfs /dev/fd0 /pcfs

   This allows your SPARCstation to read the DOS-formatted diskette from the router.

7. **Copy all of your files from the Version 5 router to the hard drive of the SPARCstation by entering this command:**

   cp -r /pcfs/* *<directory>*

   <*directory*> is the directory you created in Step 5 of this procedure.

8. **Unmount the pcfs by entering this command:**

   unmount /pcfs

9. **Eject the diskette from the diskette drive by entering this command:**

   eject

10. **Remove the diskette from the diskette drive.**

11. **Insert the diskette into the diskette drive of the router.**

12. **Enter this NCL command at the router operator's console:**

    insert

When you finish transferring the Version 5 files to your UNIX Site Manager workstation, go to Chapter 4.

Transferring Files via the Network

You can retrieve Version 5 files from the router and transfer them to your UNIX Site Manager workstation using a TFTP binary-mode GET file operation. For more information on how to use the UNIX **tftp** command, refer to your UNIX system user documentation or online system man pages.

Table 3-2 lists the Version 5 files you must transfer (back up) from the router's default file system volume.

Table 3-2. Version 5 Files to Transfer to the Workstation

At root level	**In the */help* directory**	
ace.out	*atstat.hlp*	*ipxstat.hlp*
config	*bufstat.hlp*	*lbstat.hlp*
dmap.out	*cirstat.hlp*	*ncl.hlp*
/help	*conf.hlp*	*stats.hlp*
log	*dnstat.hlp*	*system.hlp*
netboot.out	*eventlog.hlp*	*t1stat.hlp*
vrtx.out	*ipstat.hlp*	*xrxstat.hlp*

When you finish backing up your Version 5 files, go to Chapter 4 to upgrade your Version 5 files (*config* and router software image) for use with the Version 10.0 router software.

Chapter 4
Continuing the Upgrade: Converting and Customizing Files

This chapter describes how to

- Customize the software image for a router
- Convert Version 5 configuration files from a router
- Verify and further customize converted (upgraded) configuration files

Refer to the following table for the tasks you need to perform to convert and customize files.

If your Site Manager workstation is a	Perform only the instructions in Tasks
DOS PC running Windows	1, 2A, and 3
UNIX workstation	1, 2B, and 3

Task 1: Customizing the Router Software Image

Note: *Before you begin Task 1, read "About Converting Configuration Files."*

Site Manager provides a tool, the Image Builder, that lets you customize a Version 10.0 software image for the Version 5 router that you want to upgrade. To access the Image Builder, select Tools→Image Builder from the main Site Manager window.

Make sure that the image you want to customize resides on the Site Manager workstation or PC.

To customize a software image:

- Remove any nonessential files (protocols) that you will not use. For example, you might want to remove specific protocols to make more space available on the target Flash card (NVFS) volume.
- Add components (protocols) that you removed inadvertently. For example, you might have removed files that you decide you want in the router software image.
- Save the customized router software image to your current directory on your Site Manager workstation or PC.

In addition to customizing a Version 10.0 software image by removing or adding protocols, you can use the Image Builder tool to do the following:

- Display a router software image as a list of individual components.
- Display the additional router software shipped from Bay Networks as a list of individual components.
- Report the size of selected files and the projected size of the new router software image.
- Save an image to a specified directory on your Site Manager workstation or PC.
- Archive all files loaded into the Image Builder to the directory *builder_dir* on your Site Manager workstation or PC.

Refer to *Modifying Software Images for Routers* for instructions on customizing the router software image for a router you want to upgrade. When you finish customizing the router software image, follow the instructions for converting a Version 5 *config* file on a PC (Task 2A) or on a UNIX workstation (Task 2B).

About Converting Configuration Files

To transfer a Version 5 configuration file to the router you want to upgrade, you must first convert the configuration file to a Version 7.56 binary file using the *convert.exe* utility.

The Site Manager installation software automatically installs the *convert.exe* utility on your Site Manager workstation or PC. The *convert.exe* utility reads the existing Version 5 *config* file, upgrades configuration parameters and related features in that file, and creates the following new files:

- A Version 7.56 binary configuration file

  The *convert.exe* utility names this file <*filename*>.*v7*, where <*filename*> is the name of the file it reads (typically *config*).

- An ASCII report that provides details about each translation mapping

  The *convert.exe* utility names this file <*filename*>.*rpt*, where <*filename*> is the name of the file it read (typically *config*) and *rpt* signifies “report.” Use this file for troubleshooting only.

When you want to review a *config.rpt* file for troubleshooting purposes, you can print the file to the screen or to a printer, or you can display the file using a text editor.

The following is an excerpt from a sample *config.rpt* file created by *convert.exe*.

```
-SYSTEM (
  +LOCATION=~xyz~System Location = xyz
  +CONTACT=~Local User ~System Contact = Local User
  -LOGGER=1Enable Logging = Yes
  -RESET=1Automatic Reboot = Yes
  -AUTO=1Auto Enable = Yes
  +NAME=RFS_1_CFG5System Name = RFS_1_CFG5

+SESSION (
   +MODE=0Session Mode = User
    -REFRESH=3Screen Refresh Rate = 3
    -TTYPE=4Terminal = ANSI
     +MODEM=0Enable Modem Control = No
     +STOPBITS=4Stop Bits = 2
     +CHARBITS=8Bit / Char. = 8
     +PARITY=0Parity = None
     +BAUD=9600Baud Rate = 9600
     -XON=1Flow Control = XON/XOFF
    -DEVID=2Device ID = Console
   -FILTER=4Event Filter Level = Show All Events
  )
+SESSION (
   +MODE=1Session Mode = Disk Logging
    -LOGSIZE=200Log File Size = 200
   -FILTER=4Event Filter Level = Show All Events
  )

+SESSION (
   +MODE=4Session Mode = Telnet
    -REFRESH=3Screen Refresh Rate = 3
    -TTYPE=2Terminal = VT100
    -DEVID=12Device ID = Telnet
   -FILTER=4Event Filter Level = Show All Events
  )

-SLOT_MTU (
   -SLOT_MTU=1Size = 4852 Bytes
   -SLOT=4Slot = 4
```

To interpret the contents of the *config.rpt* file, refer to Table 4-1.

Table 4-1. Format of the *config.rpt* File

Format Symbol	Description
Plus (+) sign	Precedes each successful parameter translation. The Version 5 parameter and setting appear to the left of the first equal sign in capital letters, and the new (upgraded) Version 7.56 parameter and setting appear to the right.
Minus (-) sign	Precedes each unsuccessful parameter translation.

The *convert.exe* utility does not provide error checking. Any configuration errors in the existing *config* file also appear in the newly upgraded file. Use the Version 5 Configuration Editor to correct errors before converting the file. You can also use the Version 4.0 Configuration Manager to correct errors after converting the file.

Modifying the Configuration File

Before you convert the Version 5 configuration file, you should delete the following protocols and related features from the Version 5 configuration file:

- SMDS (Switched Multimegabit Data Service), BOOTP, EGP, IPSO security, OSI, PPP, TCP, and X.25
- Frame Relay

  The Version 10.0 router software cannot use *convert.exe* output for Frame Relay circuits originally defined in your Version 5 configuration file.
- PPP synchronous lines

  You must delete PPP circuits from any Version 5 *config* file you want to upgrade to a Version 7.56 file. After upgrading the Version 5 file, you add the PPP circuits back into the configuration under Site Manager Version 4.0.
- Traffic filters

  Appendix A of this guide contains guidelines for creating Version 10.0 filters. *Configuring Traffic Filters and Protocol Prioritization* describes how to use Site Manager to configure the filters.
- Route filters

- System records (such as the contact person and location of the router)

  The Version 10.0 router software does not support these features. The Site Manager main menu provides fields for this information.

- Version 5 features that are not supported in Version 7.56

  These features are AppleTalk zone filters, source routing hop-count reduction, and encapsulated SNMP traps.

You delete these protocols and related features from the configuration file because the *convert.exe* utility will not upgrade them in its Version 7.56 output file.

File Conversion Considerations

When you are converting configuration files, remember to do the following:

- Verify default parameter settings

  If a Version 5 parameter has a default setting and that setting differs from the default setting in Version 7.56, the parameter automatically adopts the Version 7.56 default setting. Make sure that you verify all configuration parameters before booting a converted configuration file on a router.

- Configure an SNMP community

  If you do not have an SNMP community configured in the configuration file you are upgrading, Site Manager automatically converts your configuration file to have the SNMP community "public" with a wildcard manager (0.0.0.0). Bay Networks strongly recommends that you restrict read-write access to the router. See *Configuring SNMP, BOOTP, DHCP, and RARP Services* for details on configuring an SNMP community.

Configuration File Upgrade Procedure Summary

The following steps summarize the upgrade procedure for Version 5 configuration files:

1. **Convert a Version 5** ***config*** **file to a binary Version 7.56** ***config*** **file.**

   Alternatively, you can create a new *config* file for the router you want to upgrade. For more information about creating new configuration files, refer to *Configuring Routers*.

2. **Open the new Version 7.56 configuration file and perform the following functions:**

   - Re-identify the router's hardware configuration (router type, module type per slot, and so forth) in the file.
   - Check for default parameters and correct any new parameter settings in the file according to your network configuration requirements.
   - Add any new Version 10.0 features and traffic filters you want in the file.

3. **Use TFTP to transfer the new Version 7.56 configuration file to a router running Version 10.0 software.**

   This is the router that you booted off *startup.cfg.*

4. **Boot the router using the converted Version 7.56 configuration file.**

5. **Save the converted Version 7.56 configuration file to Flash on the router running the Version 10.0 router software.**

   Specify a file name other than *config (*for example, *config.new).*

   This updates the MIB version stamp on the Version 7.56 configuration file to Version 10.0, resulting in a new configuration file that contains Version 10.0 configuration parameters and features.

6. **Save the completed configuration to Flash on the target router.**

Note: *Steps 3 through 6 of this procedure are described in detail in Chapter 5.*

Task 2A: Converting a Version 5 Configuration File on a PC

To convert a Version 5 *config* file on a PC to a Version 7.56 configuration file:

1. **Open the File Manager from the Program Manager window.**
2. **Double-click on** *convert.exe* **in the appropriate directory.**

   The Convert Utility window opens.

   By default, the *convert.exe* utility resides in the *\wf* directory.
3. **Select Run from the Action menu.**

   The Source File Specification window opens.
4. **Select the drive that contains the** *config* **file in the Drives scroll box.**

   The drive selection appears at the lower right corner of the window.
5. **In the Directories scroll box, select the directory that contains your configuration file.**
6. **Select the filename in the File Name scroll box.**

   For example, if your filename is *config*, select it in the scroll box. The path to the filename (for example, *\wf\v580backup*) appears in the File Name box.
7. **Click on OK.**

   The *convert.exe* utility upgrades the *config* file to a Version 7.56 configuration file.

   During the upgrade, the *convert.exe* utility displays any incompatibilities it finds between the Version 5 *config* file and the Version 7.56 software requirements on the screen in this format:

   `Note: <text of message>`

Note: *During file conversion, messages generated by the* convert.exe *utility do not necessarily indicate a problem in the conversion process. Incompatibilities do not prevent translation of the rest of the file.*

Example

The following is an example of what you see when you run *convert.exe* on a Version 5 *config* file:

```
This program will put the version 7 file in: cfg10.v7
and it will put a report on what it translated in:
cfg10.rpt

PLEASE NOTE:
This program is more strict than the router itself when
interpreting configuration files, so you may see messages
that look like:
Note: <text of message> (continuing translation)

This is normal, and does not prevent translation of the
rest of the configuration.

Note: couldn't find OSPF Interface Password for 0.0.0.0
(continuing translation)
Note: couldn't find OSPF Interface Password for 0.0.0.0
(continuing translation)
Note: Making the SNMP Community 'public' Read/Write
(necessary for series7)
Translation completed
```

8. Click on OK.

If the file conversion is successful, the Control Message window displays this message:

```
Config file - c:\<pathname>\config
dumped successfully into the file:
c:\<pathname>\<filename>.v7
Report dumped successfully into the file:
c:\<pathname>\<filename>.rp
```

a. Click on OK, then select Exit from the File menu.

b. Go to “Task 3: Customizing a Converted Configuration File” to add the router hardware configuration to the converted file.

If the conversion fails, a message indicates that the *convert.exe* utility was unable to convert your *config* file due to errors it detected in that file. In this case, perform the following troubleshooting steps:

a. **Try again to transfer your Version 5 configuration file from the router to the workstation or PC using TFTP.**

b. **Convert the file again using the *convert.exe* utility.**

If this proves unsuccessful, use Site Manager to build a new (Version 10.0) configuration file for the router you want to upgrade.

Task 2B: Converting a Version 5 Configuration File on a UNIX Workstation

To convert a Version 5 *config* file to a Version 7.56 configuration file:

1. **Select the directory that contains the Version 5 *config* file.**

   For example, */usr/wf/v580backup*

2. **Convert the Version 5 *config* file using the *convert.exe* utility.**

   Enter the following command:

   /usr/wf/bin/convert config

   The *convert.exe* utility displays any incompatibilities it finds between the Version 5 *config* file and the Version 7.56 software requirements on the screen in this format:

   ```
   Note: <text of message> (continuing translation).
   ```

Note: *During file conversion, the messages generated by the* convert.exe *utility do not indicate a problem in the conversion process. Incompatibilities do not prevent translation of the rest of the file.*

If the conversion succeeds, the Control Message window displays this message:

```
Translation completed
```

Go to "Task 3: Customizing a Converted Configuration File" to add the router hardware configuration to the converted file.

If the conversion fails, a message indicates that the *convert.exe* utility was unable to convert your *config* file due to errors it detected in that file. In this case, perform the following troubleshooting steps:

a. **Try again to transfer your Version 5 configuration file from the router to the workstation or PC using TFTP.**

b. **Try again to convert the file using the *convert.exe* utility.**

If this proves unsuccessful, use Site Manager to build a new (Version 10.0) configuration file for the router you want to upgrade.

Task 3: Customizing a Converted Configuration File

After you convert a configuration file, you must use the Configuration Manager to re-identify or re-establish the router's hardware configuration in the resulting Version 7.56 *config* file. You do this by restoring the definitions of any link modules, circuits, protocols, filters, or other features not mapped automatically by *convert.exe* into your Version 7.56 configuration file. The Configuration Manager reassociates the circuit and protocol configurations that existed on those link modules and slots in the router you are upgrading.

After you re-establish the hardware configuration in the converted configuration file, you must

- Add an IP interface to the configuration file if it does not already contain one.
- Verify (and, if necessary, adjust) Version 7.56 default settings in the file.
- Add any Point-to-Point circuits deleted just prior to file conversion.
- Upgrade any Frame Relay circuits in the configuration.
- Create traffic filters, if appropriate, for the configuration and location of the router in your network.
- Inspect the file and make any other corrections you deem necessary.

You also use the Configuration Manager to enhance your converted and redefined configuration file with new features.

Identifying the Router Hardware Configuration

This section describes how to use Site Manager to add router type (AFN, LN, CN, ALN, FN) and link module information to a configuration file that you have converted successfully.

To add the router's hardware information to a *config* file:

1. **Start up Site Manager.**
   - From a UNIX workstation, enter this command

     wfsm &
   - From a PC, double-click on the PC Site Manager icon.

   The Site Manager window opens.
2. **Select the Tools option in the menu bar.**

   The Tools menu opens.
3. **Select the Configuration Manager.**

   A menu appears to the right of the Tools menu.
4. **Select Local File.**

   The Open Configuration File window opens.
5. **Select the filename** <*filename*>.*v7* **in the scroll box.**
6. **Click on OK.**

   A popup window prompts you for the router type.
7. **Click on the box identifying the router type. Then select Confirm.**

   The Configuration Manager window opens, displaying the number of slots on the router you are configuring. The slots are numbered from the bottom up in the Configuration Manager window. All VME-based routers have a SYSCON-II and SYSIO in Slot 1. You must configure all other slots.

   Remember that Site Manager displays Slots 1–*n* as they appear when viewing the router from the back; that is, the bottom slot is Slot 1, and so forth.

8. **Select the first available empty slot under the Description column.**

   A popup window displays the link module types.

9. **Click on the appropriate link module. Then click on OK.**

   Site Manager automatically displays the connector names associated with the link module you selected.

10. **Repeat Steps 8 and 9 for each link module in the router.**

11. **Select File→Save As.**

    The Save Configuration File window appears.

12. **Type confighd (for config with hardware) in the Enter File Name box.**

13. **Select Save in the Save Configuration File window. Then click on OK in the confirmation window.**

    Site Manager in local mode saves *confighd* as a Version 7.56 configuration file.

Adding an IP Interface

You must configure an IP interface on the router to enable the router to support a connection to a Site Manager workstation.

If your *confighd* file	Then
Includes an IP interface	Go to the next section, "Verifying and Customizing Default Settings."
Does not include an IP interface	1. Use the Configuration Manager to open the file and add the interface. 2. Save the file. If necessary, refer to *Configuring Routers* for instructions on how to add a new IP interface.

Later in the Version 5 to Version 10.0 upgrade process, you replace the default configuration file on the router with a converted or new configuration file that includes the required IP interface. You provide the IP address of this interface to Site Manager, which can then establish a connection to the router you want to upgrade.

Verifying and Customizing Default Settings

To verify and change default settings in the *confighd* file:

1. **Open the *confighd* file.**
2. **Carefully inspect the parameter settings in this file.**

   Be aware that default settings for some parameters changed between Version 5.*xx* and Version 10.0.
3. **Modify or add new settings to meet your network configuration requirements.**

If you need to	Refer to
Redefine PPP circuits deleted before converting the Version 5 *config* file	"Redefining Point-to-Point Circuits"
Delete and redefine Frame Relay circuits, which do not upgrade when you run *convert.exe*	"Redefining Frame Relay Circuits"
Restore protocols deleted by *convert.exe,* or add new protocols	"Re-entering and Adding Protocols"
Add new (Version 10.0) features	"Adding Version 10.0 Features"
Add new (Version 10.0) traffic filters	"Adding Traffic Filters"
Do none of the above	Chapter 5, to complete the upgrade to Version 10.0

Note: *Save your edits and enhancements to the* confighd *file.*

Redefining Point-to-Point Circuits

If the router you are upgrading needs to support PPP over a synchronous line, read this section.

Before running *convert.exe*, you deleted from your Version 5 *config* file any synchronous lines running PPP. If file conversion was successful, you can restore the synchronous lines running PPP in your new (Version 10.0) *config* file.

For information on how to use the Configuration Manager to enable PPP on a synchronous line, refer to *Configuring PPP Services*.

If you need to configure PPP on a synchronous line between a Version 5 router and a Version 10.0 router, refer to Appendix B.

Redefining Frame Relay Circuits

If the router needs to support Frame Relay circuits, follow the instructions in this section.

Deleting and Configuring Frame Relay Interfaces

The upgrade procedure does not convert all Frame Relay circuit records. Some Site Manager screens will not display unconverted records. You must delete all interfaces on which Frame Relay was configured and reconfigure them, as follows:

1. **Open the** *confighd* **file, which is your most up-to-date configuration file, using the Configuration Manager.**

Note: *This file is already open if you followed the steps in the previous section and did not exit. Note that the filename appears near the top of the window.*

2. **Select Circuits→Delete Circuits.**

   The Circuit List window displays the circuits.

3. **Select each circuit on which Frame Relay was configured in the original Version 5** *config* **file you converted.**
4. **Select Delete.**
5. **Select Done.**

6. **For each circuit you deleted in Step 4, select Circuit→Add Circuit and reconfigure the circuit.**

   For information about configuring Frame Relay circuits, refer to *Configuring Frame Relay Services*.

7. **Save your changes to the** *confighd* **file.**

Re-entering and Adding Protocols

In "About Converting Configuration Files," we recommended that you delete the following protocols and related features from the original Version 5 configuration file:

- SMDS
- BOOTP
- EGP
- IPSO security
- OSI
- PPP
- TCP
- X.25 configuration details

If your original Version 5 configuration file included any of these protocols or related features, you can re-enter them using the Configuration Manager.

To restore deleted protocols or add new protocols to your *confighd* file, refer to *Configuring Routers* and to the configuration guides for those protocols.

Remember to save your changes to the *confighd* file.

Adding Version 10.0 Features

To add Version 10.0 features to the *configd* file:

1. **Open the** *configd* **file.**
2. **Manually configure Version 10.0 features that the** *convert.exe* **utility does not support.**

   Add the new configuration features you want.
3. **Save your changes to the** *configd* **file.**

Adding Traffic Filters

Before adding any Version 10.0 traffic filters to the *configd* file, read Appendix A to review the differences between the Version 5 and Version 10.0 filtering implementations and strategies. For details on using Site Manager to configure filters, refer to *Configuring Traffic Filters and Protocol Prioritization.*

To add traffic filters:

1. **Open the** *configd* **file.**
2. **Add any Version 10.0 traffic filters you want in the** *configd* **file using the Configuration Manager.**
3. **Save your additions to the file.**

Chapter 5
Completing the Upgrade: Transferring and Testing Customized Files

This chapter describes the tasks you need to perform to transfer and test the customized files. After you have completed these steps, you have completed the upgrade procedure.

Table 5-1 lists the tasks you must complete to transfer and customize files.

Table 5-1. Transferring and Testing Customized Files

Task Number	Title
1	Booting the Router from a Flash Volume
2	Registering the Backplane Type
3	Configuring an Initial IP Connection
4	Testing the Initial IP Configuration File
5	Transferring a Customized Software Image
6	Testing the Customized Software Image
7	Transferring a Converted (or Replacement) Configuration File
8	Testing the Converted (or Replacement) Configuration File
9	Transferring Scripts to the Router

Task 1: Booting the Router from a Flash Volume

Before you attempt to boot the router from a Flash volume, ensure that

- You backed up your Version 5 router software image and configuration files, log files, and any other files critical for router recovery, in case you encounter problems during the upgrade process. (Refer to Chapter 2 (PC) or Chapter 3 (UNIX workstation) for instructions.)
- You configured the router you want to upgrade to Version 10.0 to boot from a Flash file system volume.
- The router contains a Flash card and you have inserted the Flash card in the slot to the right.
- The Flash card contains a Version 7–9.*xx* router software image, a default *config* file, and the *ti.cfg* file.

Note: *If you do not boot the router from a Version 7–9.xx router software image (*ace.out*), you cannot transfer the Version 10.0 router software image to a Flash card from your Site Manager workstation or PC. You must boot your router from a Flash card that contains Router Software Version 7–9.xx.*

You boot the router from a Version 7–9.*xx* Flash file system volume to initialize the Technician Interface on the router. You use the Technician Interface to

- Register the router's backplane type (Task 2)
- Configure and initialize your initial IP connection (Task 3)

To boot the router from a Flash volume:

1. **Press the Reset button on the router.**

   After the router boots successfully, the Technician Interface welcome message (or related message your network administrator has substituted) appears:

   ```
   Welcome to the Technician Interface

   Login:
   ```

2. **At the `Login` prompt, enter the following command to gain system administrator access.**

   Manager

   The default Technician Interface prompt (`$`) appears on your ASCII console screen after you log in.

3. **Go to "Task 2: Registering the Backplane Type."**

Task 2: Registering the Backplane Type

To register the backplane type of your FN, ALN, LN, or CN (not AFN) router from the Technician Interface:

1. **Enter the backplane command, followed by the backplane type**

   backplane *<type>*

   <type> is FN, LN, or CN

Note: *If you have an LN or ALN router, enter* **backplane LN**

2. **Press the Reset button.**

   After the router boots successfully, the following message appears at the console:

   ```
   Welcome to the Backbone Technician Interface

   Login:
   ```

Caution: *Boot the router after entering the* **backplane** *command. This ensures that the backplane type registers. You enter the* **backplane** *command only once during the life of a system controller unless you insert that controller in another FN, ALN, LN, or CN router.*

3. **Log in to the Technician Interface as Manager.**

Continue the upgrade process with "Task 3: Configuring an Initial IP Connection."

Task 3: Configuring an Initial IP Connection

You configure an initial Internet Protocol connection to

- Use the IP network as a medium for transporting your customized image and converted configuration files from the workstation or the PC to the router.
- Ensure that your Site Manager workstation or PC can communicate with the router during the remainder of the upgrade process.

Refer to *Quick-Starting Routers and BNX Platforms* for details on using the Technician Interface to configure and save an initial IP connection to a file.

Note: *Make sure that you save the initial IP configuration as* startup.cfg. *You will need this file later in the upgrade procedure.*

Task 4: Testing the Initial IP Configuration File

After you save the initial IP connection configuration to a file on the router's Flash card, use Site Manager to establish an IP connection between the workstation or the PC and the router.

To establish an IP connection to the router:

1. **Display the Site Manager window.**
2. **Select Options→Router Connections.**

   The Router Connections Options window opens.
3. **Enter the IP address of the router in the Node Name/IP Address box.**
4. **Click on OK.**

   When Site Manager establishes a connection to the router, it closes the Router Connections Options window and displays the IP address of the router in the Site Manager window.

Task 5: Transferring a Customized Software Image

This section describes how to prepare the router to receive the customized image and how to transfer the customized image to the router.

Preparing a Router to Receive the Customized Image

Refer to Table 5-2 to find the section that corresponds to your router hardware configuration.

Table 5-2. Section Corresponding to Your Hardware Configuration

If the number of Flash cards in the router is	Refer to
1	"Preparing a Flash Card to Receive the Customized Image"
2	"Transferring a Customized Image to the Router"

Preparing a Flash Card to Receive the Customized Image

To prepare a Flash memory card to receive a customized image:

1. **Delete the existing router software image from the Flash memory card using the Router Files Manager.**

   The filename of the image disappears from the Router Files Manager window.

   After you delete the image, compare the "Available free space" field displayed in the Router Files Manager window to the "Contiguous free space" field. Although you deleted a file (in this case, the image), it continues to take up space until you compact the contents of the Flash card. (See *Managing Routers and BNX Platforms* for more information about file compaction.)

2. **Compact the contents of the Flash card.**

   Select Commands→Compact in the Router Files Manager window.

3. **Click on OK in the confirmation window.**

   An hourglass appears for the duration of the file compaction. After several minutes, a window displays the following message, where *x* is the volume you are compacting:

   `Last file system command, "compact x:", finished successfully.`

4. **Click on OK in the message window.**

   The available free space and contiguous free space are now equal.

Continue to the next section to copy your new, customized Version 10.0 router software image to the router.

Transferring a Customized Image to the Router

To transfer a customized image file to the router you want to upgrade, use the Router Files Manager. To access the Router Files Manager, select Tools→Router Files Manager in the Site Manager window.

To transfer your customized image to the router:

1. **Select File→TFTP in the Router Files Manager window.**

   This invokes the TFTP (Trivial File Transfer Protocol) software to execute file transfers.

2. **Select Put File.**

   The TFTP Put File window displays the Local Filename box.

3. **Enter the local directory path and filename of the image you customized.**

4. **Click on OK.**

   The TFTP Put File window displays the destination volume and filename of the image in the Remote Filename box.

   If you are using a router with two Flash cards, change the volume number in the Remote Filename box from "1" to "2." This indicates that you want to save the file to the second (left) Flash card.

   Otherwise, do not change the volume number displayed in the box.

5. **Verify that the image filename you transfer to the router you are upgrading is one of the following:**

Router	Image Filename
FN, ALN, LN, or CN	*ace.out*
AFN (Flash)	*afn.exe*

6. **Click on OK.**

7. **Click on OK in the confirmation window.**

   On UNIX workstations, a window displays the following message:

   ```
   "wftftp" process started in background [pid 5606]
   ```

8. **Click on OK.**

   On UNIX workstations, a window displays the following message:

   ```
   "wftftp" -h <IP Number> -T 1.500000-..." command completed
   successfully [pid 5607]
   ```

If	Then
The transfer completed successfully.	Click on OK. The Router Files Manager window displays the image filename in the list of files.
The transfer failed.*	1. Recheck your setup for this TFTP operation. 2. Try the transfer again. If you need assistance, call the Bay Networks Technical Response Center.

* If the transferred failed, do not reboot the router.

Go to "Task 6: Testing the Customized Software Image."

Task 6: Testing the Customized Software Image

To test the Version 10.0 customized software image you transferred to the router in Task 5, you must

- Boot the router and verify that it booted successfully
- Copy the customized image to primary Flash

Booting the Router

To boot the router:

1. **In the Site Manager window, select Administration→Boot Router.**

   The Boot Router window opens, displaying default filenames for the router software image and the configuration file.

If	Then
You transferred the image to Volume 2	Click on the box inside the "1:" box and continue with Step 2.
You did not transfer the image to Volume 2	Go to Step 3.

2. **Click on "2:" to indicate that you want to boot using the Flash memory card on the left side of the Flash System Controller board.**

   The "1:" to the right of the Boot Image field changes to a "2:". Note that the volume specification next to the Configuration field is "1:". Do not change this volume.

3. **Change the name of the file in the Configuration box to** ***startup.cfg*****.**

   You created *startup.cfg* in Task 3.

4. **Click on Boot.**

   Wait a few minutes for the router to finish booting.

5. **Verify that the router booted successfully.**

   Select View→Refresh Display in the Site Manager window.

If the router booted successfully, it establishes a connection and displays system information (such as the system name, contact, location, description, and MIB version). This confirms that the router can boot with the customized image.

If Site Manager does not display system information in its main window, the router did not boot successfully. In this case, perform the following steps:

1. **Try again to transfer the customized image to the router (see Task 5).**
2. **Boot the router again.**

If the problem persists, call the Bay Networks Technical Response Center in your area.

Copying the Customized Image to Primary Flash

After you verify that your router is running the Version 10.0 router software image, you can copy the customized image from your backup Version 10.0 Flash card to the primary Flash card. Do this when you are ready to delete the Version 7–9.*xx* image from your primary Flash card.

Note: *If you boot the router without specifying the volume from which to read the image, and the PCMCIA/Floppy switch is in the PCMCIA position, the router boots from the image in Volume 1 (the Flash card on the right side of the Flash System Controller). Volume 2 (the Flash card on the left) currently contains your customized image, while Volume 1 contains a Version 7–9.xx router software image.*

To replace the existing image in Volume 1 with your customized Version 10.0 image, *ace.out* or *afn.exe* (as appropriate for the router):

1. **In the Router Files Manager window, delete** *ace.out* **(or** *boot.exe* **for an AFN router) from Volume 1.**

   After you delete the old image, compare the “Available free space” field displayed in the Router Files Manager window to the “Contiguous free space” field. You cannot load a file onto the Flash card if the file is larger than the available “Contiguous free space”.

   To make available a maximum amount of contiguous free space, you must compact the remaining contents of the Flash card. For more information about file compaction, refer to *Managing Routers and BNX Platforms.*

2. **Compact the contents of the Flash card.**

   Select Commands→Compact in the Router Files Manager window.

3. **Click on OK in the confirmation window.**

   An hourglass appears for the duration of the file compaction. After several minutes, a window displays the following message, where *x* is the volume you are compacting:

   `Last file system command, "compact <x>:", finished successfully.`

4. **Click on OK in the message window.**

   The available free space and the contiguous free space are now equal.

5. **Display the files on Volume 2 and select the image file (***ace.out* **or** *afn.exe***) you want to copy.**

6. **Select Commands→Copy.**

   The Router Files Manager displays the source filename in the Copy File window.

7. **Verify that the source filename is** *2:ace.out*. **or** 2*:afn.exe***, then click on OK.**

   The Copy File window prompts you for the destination filename.

8. **In the Destination field, overtype** *2:ace.out* **with** 1**:***ace.out* **or** 1**:***afn.exe***.**

   This specifies the new volume and filename you want to give this file.

9. **Click on OK.**

   A confirmation window opens.

10. **Click on OK.**

    The router copies *ace.out* or *afn.exe* to Volume 1.

11. **Verify that the size of the** *ace.out* **or** *afn.exe* **file that you copied to Volume 1 matches the size of the** *ace.out* **or** *afn.exe* **file in Volume 2.**

Continue to "Task 7: Transferring a Converted (or Replacement) Configuration File."

Task 7: Transferring a Converted (or Replacement) Configuration File

To transfer your converted and customized configuration file (or your new Version 10.0 configuration file) to the router you want to upgrade:

1. **Select File→TFTP in the Router Files Manager window.**
2. **Select Put File.**

   The TFTP Put File window displays the Local Filename box.
3. **Enter the local directory path and name of your most up-to-date Version 10.0 configuration file.**
4. **Click on OK.**

   The TFTP Put File window displays the destination volume and name of the configuration file in the Remote Filename box.
5. **Change the name of the file in the destination volume to something other than** *config.*

   For example, change the name of the file to *config.new.*
6. **Click on OK.**

Caution: *Avoid writing over* config *or* startup.cfg *until you successfully test your new customized configuration file (for example,* config.new*) on the router.*

7. **Click on OK in the confirmation window.**

   A window displays the following message:

   ```
   "wftftp" process started in background [pid 5606]
   ```
8. **Click on OK.**

   A window displays the following message:

   ```
   "wftftp" -h <IP Number> -T 1.500000-..." command completed
   successfully [pid 5607]
   ```
9. **Click on OK.**

   The Router Files Manager window displays the name of the configuration file in the list of files.

Continue to Task 8 for details on booting your router with the converted (or new replacement) configuration file.

Task 8: Testing the Converted (or Replacement) Configuration File

To test the converted (or replacement) configuration file that you transferred to the router in Task 7, you must

- Boot the router.
- Verify that the router booted successfully.
- Verify that the router routes traffic according to your configuration.

Booting the Router

To boot the router:

1. **In the Site Manager window, select Administration→Boot Router.**

   The Boot Router window opens, displaying default filenames for the router software image and the configuration file.

2. **Change the name of the file in the Configuration box to the name of the converted or customized file that you transferred in Task 7.**

3. **Click on Boot.**

   Wait a few minutes for the router to finish booting.

4. **Go to the next section to verify that the router booted successfully.**

Verifying that the Router Booted Successfully

Verify that the router booted correctly with the new configuration file by selecting View→Refresh Display in the Site Manager window.

If the router booted successfully, Site Manager establishes a connection to the router and displays system information (such as the system name, contact, location, description, and MIB version). This confirms that the router can boot with the new converted or replacement configuration file.

If Site Manager does not display system information in its main window, the router did not boot successfully. In this case, perform the following steps:

1. **Reboot the router with your** *startup.cfg* **file to re-establish IP connectivity.**
2. **Examine your customized** *config* **file for errors using the Configuration Manager in local mode.**

If the problem persists, call the Bay Networks Technical Response Center in your area.

Verifying that the Router Routes Traffic According to Your Configuration

Use the Statistics Manager and Events Manager tools to verify that the router routes traffic according to your configuration.

Refer to *Managing Routers and BNX Platforms* for details on using these tools.

Replacing the Existing Configuration File with the Version 10.0 Configuration File

To replace the existing configuration file with your converted and edited Version 10.0 configuration file:

1. **Open the Configuration Manager in dynamic mode.**
2. **Select File→Save As.**

   The Save Configuration File menu appears.
3. **Enter the filename** *config* **and select the correct volume where your Flash card resides.**
4. **Click on Save.**

Task 9: Transferring Scripts to the Router

Transfer from your Site Manager PC or workstation to the router any Version 10.0 Technician Interface scripts useful for your router configuration. You can use the scripts to display statistical and configuration information about various router services, and to display or disable these services.

Technician Interface Script Descriptions

The Technician Interface scripts are *.bat* and *.mnu* files that you must transfer to a memory card in each router you want to upgrade from Version 5 to Version 10.0.

- The *.bat* file enables you to generate information about a protocol or service that the router supports.
- The *.mnu* file enables you to display this information by selecting commands from menus.

Each script contains all the subcommands required to support the options that it provides. For a complete list of script files and definitions, refer to *Using Technician Interface Scripts*.

For each router you want to upgrade to Version 10.0, you must transfer a minimum set of scripts, regardless of which protocol-specific scripts you want to run on your router (Table 5-3).

Table 5-3. Minimum Set of Scripts to Transfer to a Router

Script Filename	Description
show.bat	Helps you isolate problems such as circuits that are not working, packets that are not being forwarded, and so forth.
setpath.bat	Sets the search path and aliases for the script commands.
menu.bat	Provides a menu from which you can select the script you want to run.
main.mnu	Displays the top-level menu from which you can select *.bat* files currently on the system.
monitor.bat	Displays the same information as the **show** command, but refreshes the display periodically so you can examine trends and changes.

In addition to the required script files listed in Table 5-3, you can transfer to your router any protocol-specific scripts to support the protocols on the router you are upgrading to Version 10.0. For example, if you want to run only IP and Frame Relay on a router, transfer to that router the following script files*: ip.bat*, *ip.mnu*, *fr.bat*, and *fr.mnu*.

Transferring Script Files

Before you transfer scripts, do the following:

1. **Compact the Flash card on your router.**

   Select Command→Compact from the Router Files Manager window in Site Manager. This gives you more contiguous free space on a Flash card.

2. **Check the size of the scripts you want to transfer to your router.**

   Verify that the amount of contiguous free space you have on a Flash card in your router exceeds the size of the scripts to be transferred.

We recommend that you use the Bay Networks implementation of the File Transfer Protocol (FTP) to transfer script files from your workstation or PC to the router. This method enables you to load more than one file at a time. For information on how to load scripts, refer to *Using Technician Interface Scripts.*

Appendix A
Understanding Version 10.0 Traffic Filters

Read this appendix if you previously configured traffic filters using the Version 5 Configuration Editor tool, and you want to convert (re-create) those filters using the Configuration Manager tool accessible under Site Manager.

This appendix provides

- A list of differences between Version 5 and Version 10.0 traffic filters
- Instructions for converting Version 5 traffic filters to Version 10.0

To create Version 10.0 traffic filters that are identical to your existing Version 5 traffic filters, you must

- Understand the differences between Version 5 filters and Version 10.0 filters, especially concerning filter precedence levels.
- Identify the fields and ranges of traffic you want to drop, accept, forward, direct, or log.

Once you have this information, you can use the Configuration Manager to create the necessary filters. Refer to *Configuring Traffic Filters and Protocol Prioritization* for details on creating the filters.

Comparing Version 5 and Version 10.0 Filters

Table A-1 compares the rules for configuring Version 5 versus Version 10.0 traffic filters.

Table A-1. Comparing Version 5 and Version 10.0 Traffic Filters

Version 5 Filters	Version 10.0 Filters
You can configure inbound traffic filters only.	You can configure outbound traffic filters (on synchronous circuits only), as well as inbound traffic filters.
You can define multiple filters at the same precedence level (31 possible levels).	You must define each filter at a different precedence level (31 possible levels).
You can identify multiple fields within a filter, and multiple ranges within each field.	No change.
The highest precedence level for a Version 5 filter is 31; the lowest is 1.	Precedence levels are reversed. The highest precedence level for a Version 10.0 filter is 1; the lowest is 31.
A Rule Number assigned to each filter enables you to keep track of how many filters you define on an interface (maximum of 31 filters).	A Filter Number assigned to each filter enables you to keep track of how many filters you define on an interface (maximum of 31 filters).
The Rule Number and Precedence Level assigned to a filter are unrelated numbers.	The Filter Number and Precedence Level assigned to a filter are the same number. Filter Number 1 = Precedence Level 1 (highest); Filter Number 31 = Precedence Level 31 (lowest).
You can change the precedence level assigned to a filter.	You can change the precedence level assigned to a filter, then Site Manager automatically adjusts (reassigns) the precedence levels assigned to all other filters on the same circuit.
You configure a drop-all action by specifying a field plus the action “drop all.”	You configure the “drop-all” action explicitly by specifying a field and entering as filter parameters the minimum and maximum values possible for that field.
You cannot assign a name to a filter.	You can assign a descriptive name to any inbound or outbound traffic filter.

Converting Version 5 Combination Filters to Version 10.0 Filters

This section describes how to convert Version 5 combination filters to Version 10.0 filters.

Forwarding Strategy

If your filtering strategy involves forwarding most traffic and dropping only specified packets, configure filters only for the specific types of traffic you want to drop.

Firewall Strategy

If your filtering strategy involves blocking most traffic and accepting only specified packets (a “firewall” strategy), begin with a drop-all filter on the interface. Add more specific, higher-precedence accept and drop filters to achieve the desired result on that interface.

The drop-all filter describes the broadest range of packets you need to block from the interface. From this group of packets, you specify the other, higher-precedence filters, which create exceptions or “holes” in the drop-all range.

To ensure that all unwanted traffic gets dropped:

1. **Choose a field that appears in *every* packet of the protocol you want to filter.**
2. **Determine the length of the field.**
3. **Determine the maximum possible value of the field.**
4. **Determine the minimum value of the field.**
5. **Enter these values when you define the drop-all filter.**

Figure A-1 shows the result of a drop-all filter (filter at Precedence Level 8) working in combination with more specific, higher-precedence filters (filters at Precedence Levels 1 through 7) on an interface.

- The fields shown in this example are IP address ranges (although you can choose any appropriate field).
- The Filtered Result shown at the top of the diagram indicates IP address intervals over which the interface will drop or accept packets it receives.
- Note that the highest precedence filter in a given address range determines the final result of combined filtering within that range.
- Note that each precedence level supports only one Version 10.0 filter. (Version 5 software allowed you to configure multiple filters at the same precedence level.)

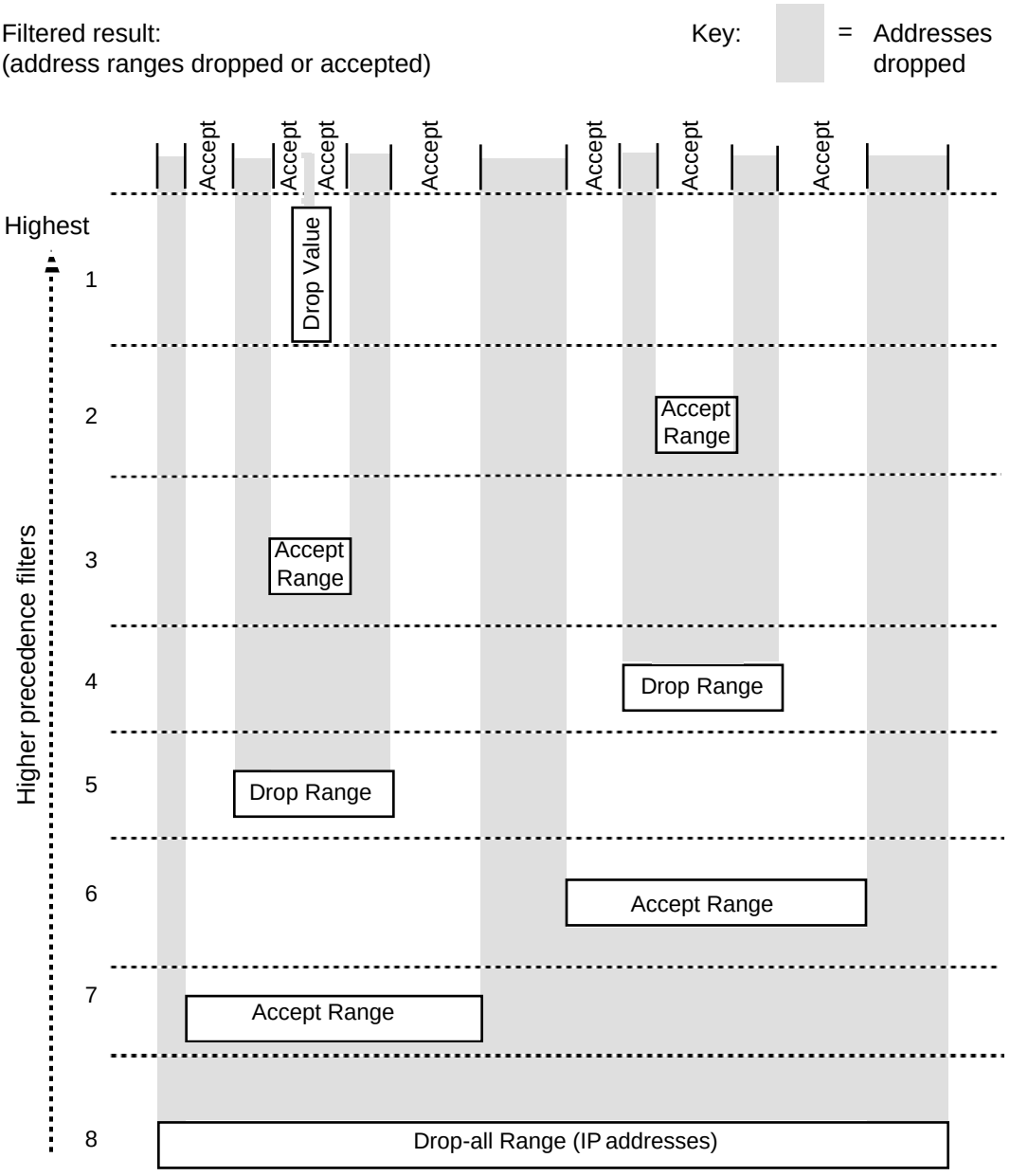


Figure A-1. Configuring Version 10.0 Filters on an Interface

Filter Precedence Reversed in Version 10.0

In Version 5, you could use precedence to override a “drop” filter with an “accept” filter. The same is true in Version 10.0, but the precedence levels have been reversed numerically (1 = highest precedence; 31 = lowest precedence).

Site Manager requires you to define filters starting with the highest-precedence (lowest-numbered) filter, and ending with the lowest-precedence (highest-numbered) filter. For this reason, design the entire combined filtering scheme for an interface first, then enter each filter, beginning with No. 1, the highest-precedence filter.

Router Performance

If possible, use a strategy that accomplishes your filtering goals mainly with drop filters, since these result in more efficient router performance.

Example of Version 10.0 Filtering on a Circuit

The following example (Table A-2) uses one drop-all filter and one accept filter with two specific values. The result of the combination of these filters on a single circuit is that all inbound packets bearing an address from 192.32.25.00 to 192.32.28.255 are dropped, except for packets addressed for destinations 192.32.28.55 and 192.32.28.70.

Table A-2. Version 10.0 Filtering on a Circuit

Filter Type	Filter Precedence Level	Filter Number	Start of Range	End of Range
Accept	1 (highest)	1	192.32.28.55	192.32.28.55
			192.32.28.70	192.32.28.70
Drop	2 (lowest)	2	192.32.25.00	192.32.28.255

Appendix B
Interoperability

This appendix describes Version 5 and Version 10.0 interoperability issues that may be of concern to you, depending on the current configuration of your Version 5 routers. The interoperability issues are

- X.25 certifiability of Version 5 routers
- Point-to-point connections over a synchronous line
- PPP Version 10.0 compatibility with previous versions
- PPP software incompatibilities
- AppleTalk OUI values for routing over SMDS or Frame Relay

Verifying X.25 Certifiability

If you are configuring your router to run X.25, refer to Table B-1, then read this section.

Table B-1. Configuring a Router to Run X.25

Router Software Version	Action
Version 7.60 or earlier	The behavior of the serial controller chips on link modules differs slightly from the X.25 standard, making them noncertifiable in X.25 networks.
Version 7.60 or later	The MK Thompson 5025 serial controller chip in the link modules now performs the LAPB function of X.25. This change significantly improves performance. However, you may still need to replace some link modules that have earlier versions of the MK5025 chip set to ensure that the router passes X.25 certification.

Follow these guidelines to ensure that you are using a link module that can pass X.25 certification:

- Do not upgrade AFN hardware.
- Do not replace link modules delivered after June 1992.
- Upgrade link modules directly attached to the X.25 network that were delivered before October 1991.
- Inspect only the link modules directly attached to the X.25 network that were delivered between October 1991 and June 1992. Determine which modules to replace by removing the link module from the router and reading the revision level of any MK5025 chip on that module. If the revision level is C03 or later, do not replace.

Note: *If you need hardware to upgrade your router for X.25 support, order it from Bay Networks. Specify that the router needs this hardware to satisfy X.25 certification requirements.*

Configuring Point-to-Point over a Synchronous Line

This section describes how to configure a point-to-point connection using the Point-to-Point protocol over a synchronous line between a Version 5 and a Version 10.0 router.

HDLC Local/Remote Address Settings

On Version 5 routers, you must designate an HDLC “local address” and “remote address” at each end of a point-to-point synchronous line. The router at each end receives packets at the designated local address and send packets to the remote (destination) address.

For each of these parameters, you use Version 5 NCL to either

- Set an implicit address value of DCE (which the router recognizes as a value of 0x01) or DTE (0x03).
- Set a unique explicit address value in the hexadecimal range 0x00 to 0x99, inclusive.

Whatever local-remote address pair you assign at one end of a point-to-point synchronous line, you reverse on the Version 5 router at the opposite end of the line. For example, the synchronous circuit on Router A in Figure B-1 has an explicit local address (LA) value of 0x04 and a remote (destination) address (RA) of 0x05. In this case, you configure the synchronous circuit on Router B at the opposite end of the same line with a local address (LA) value of 0x05 and a remote address (RA) value of 0x04.

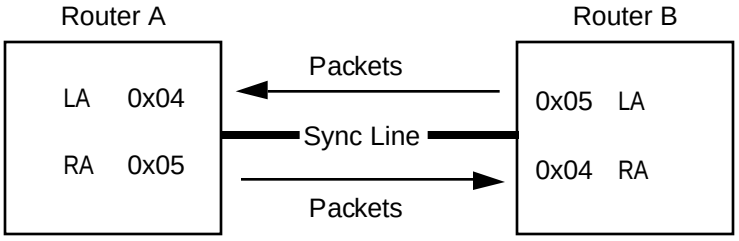


Figure B-1. Address Assignments on a Point-to-Point Synchronous Line

The Version 5 Configuration Guide

- States correctly that you should not use the well-known DCE and DTE values 0x01 and 0x03 for any explicit local or remote address on a point-to-point circuit
- States erroneously that the local and remote address values are decimal rather than hexadecimal numbers

On Version 10.0 routers, you use the Version 4.0 Configuration Manager and follow essentially the same guidelines for local-remote address pair assignments at each end of a point-to-point synchronous line. The Configuration Manager allows you to choose 0x02, 0x04, 0x05, 0x06, and 0x07 as (1-byte) explicit values for Local Address or Remote Address in the synchronous line parameters window. (You can extend an explicit local or remote address value to 2 bytes in length by enabling the Extended Address parameter under the Sync circuit line parameter group.)

The Version 10.0 Technician Interface imposes no constraints on the values you choose for the local-remote address pair.

Point-to-Point Configuration Guidelines

If you want to configure a point-to-point synchronous line between a Version 5 and a Version 10.0 router, follow the guidelines in Table B-2 and in the subsection that follows.

Table B-2. Point-to-Point Configuration Guidelines

If you need to	Then
Configure a synchronous circuit on the local router to DTE	Configure the synchronous circuit on the router at the other end of the same synchronous line to DTE as well.
Configure a synchronous circuit on the local router to DCE	Configure the synchronous circuit on the router at the other end of the line to DCE as well.
Use explicit values for the local-remote address pair	Limit your selections to 0x02, 0x04, 0x05, 0x06, and 0x07 at each end. However, if this constraint proves impractical due to the requirements of your existing Version 5 router and network configuration, use the Technician Interface on the Version 10.0 router to • Override Version 4.0 Configuration Manager explicit local-remote addressing constraints for Version 10.0 routers. • Match (and reverse) the Version 5 local-remote address assignments on your Version 10.0 router.

Connecting a Version 10.0 Router to a Version 5 Router

To connect a Version 10.0 router to a Version 5 router, point-to-point over a synchronous line, enter the following commands at the Technician Interface:

s wfSyncEntry.wfSyncLocalAddress.*<slot>.<connector> <integer value>***; commit**

s wfSyncEntry.wfSyncRemoteAddress.<*slot*>.<*connector*> <*integer value*>**; commit**

save config *<config name>*

<slot>.<connector> is the slot and connector (that is, the synchronous circuit) you want to configure.

<integer value> is any explicit address value in the range 0x00 to 0x99, excluding 0x01 (the DCE setting) and 0x03 (the DTE setting).

The Version 5 synchronous circuit BOFL timer has a default value different from the Version 7–9.*xx* BOFL default value. Version 5 routers use a synchronous circuit BOFL default value of 10. Version 7–9.*xx* routers have a synchronous circuit BOFL default value of 5, but you can change it to match the BOFL value of the Version 5 router at the opposite end of the synchronous line.

PPP Version 10.0 Compatibility with Previous Versions

A router running the Bay Networks Version 10.0 PPP implementation communicates with a router running Version 9.0*x* using the Link Control Protocol (LCP) on each line, just as if both routers were running Version 9.0*x*. In this case, the routers use either random or address-based load-balancing algorithms. A multi*link* circuit using PPP cannot communicate with a router running a version earlier than 9.00 because versions earlier than 9.00 use a multi*line* circuit in which LCP is run on only one line.

PPP Software Incompatibilities

If you need to configure PPP to run over a point-to-point connection between a Version 5 and a Version 8.*xx*–10.0 router, you need to read this section.

Version 5.*x* router software uses a Bay Networks proprietary implementation of PPP. Version 7–10.0 routers support a new implementation of PPP. The new implementation complies with the established requirements of Internet RFCs 1331, 1333, 1548, and 1661. Version 10.0 routers also support the multilink feature, described in RFC 1717.

With the different implementations of PPP, each adhering to a different set of RFCs, the following functions will not work between a Version 5.*x* and a Version 9.*xx* or 10.0 router:

- Link Quality Monitoring (LQM)
- Source-routing over Token Ring networks

For communication over a synchronous line between a Version 5 router running PPP and a Version 10.0 router running PPP, make the following configuration checks:

- On the Version 10.0 router
  - The type of synchronous line service (MIB object ID 1.3.6.1.4.1.18.3.4.5.1.18, *wfSyncService*) must have a value of *Transparent*. (This is the default setting for the Service parameter in the Edit Sync Parameters window. To access the parameter through the Configuration Manager, click on the appropriate synchronous connector and select Edit Line Details.)
- On the Version 5.*x* router
  - The LQM Time parameter must have a value of 0, which disables Link Quality Monitoring on the Version 5.*x* router.
  - The Quality of Service parameter must have a value of LLC1, the default setting.

For information on how to check these Version 5.*x* parameters, refer to your Version 5.*x* configuration guide.

AppleTalk OUI Values for Routing over SMDS or Frame Relay

Bay Networks routers running software earlier than Version 5.77 and configured to route AppleTalk over SMDS or Frame Relay use an Organizationally Unique Identifier (OUI) value of 0 instead of 0x080007, the value appropriate for Datagram Delivery Protocol (DDP) packets. Your router supports the correct OUI value upon completion of the upgrade to Version 10.0.

Glossary

ace.out	Router software image containing executable files used to boot FN, LN, ALN, AFN with diskette, and CN routers.
afn.exe	Router software image containing executable files used to boot an AFN router.
an.exe	Router software image containing executable files used to boot an AN or ANH router.
asn.exe	Router software image containing executable files used to boot an ASN router.
bn.exe	Router software image containing executable files used to boot a BN router.
booting	The process in which a device obtains information and begins to process it to attain a state of normal operation.
BOOTP	Bootstrap Protocol, a TCP/IP network protocol that lets network nodes request startup and configuration information from a BOOTP server node.
config	Network configuration file containing proprietary protocol services code.
Directed Netboot	Bay Networks procedure for getting router startup files from a TFTP server on the IP network.
DLCMI	Data Link Control Management Interface. Specification for the use of Frame Relay products that defines a method of exchanging status information between devices.
DOS	The primary disk operating system used by IBM and compatible personal computers.
driver	A hardware device or program that controls or regulates another device.
dynamic	The ability of a display or view to change as a result of ongoing network activity.
Ethernet	Type of network cabling and signaling that operates at the data link layer of the OSI model.

Flash Memory	Removable Personal Computer Memory Card International Association (PCMCIA) standard memory card. The ASN uses a Flash memory card to provide storage for its nonvolatile file system (NVFS), called the *local file system*.
Frame Relay	Standard, connection-oriented protocol for use between data terminal equipment and data communications equipment. Frame Relay complies with the ANSI Annex D and LMI Frame Relay management specifications, along with the CCITT (now ITU-T) Annex A specification.
freboot.exe	Copy of the bootstrap image resident on the Boot PROM for the BCN and BLN router.
frediag.exe	Copy of the diagnostic image resident on the Diagnostic PROM for the BCN and BLN.
HDLC	High-Level Data Link Control, a protocol that provides error correction at the data link layer.
image	One or more executable files used to boot a router; for example, *asn.exe*.
IP	The Internet Protocol defined in RFC 791.
Local Boot	Bay Networks procedure for getting router startup files from the file system stored in local Flash memory.
MB	Megabytes.
MIB	Management Information Base. A standard or proprietary database that contains network configuration parameters and statistics.
modem	A modulator-demodulator, a device that converts digital signals used by computers to analog signals that can be transmitted over telephone lines, and vice versa.
MS-DOS	Microsoft Disk Operating System. A version of DOS used by computers that are compatible with IBM personal computers.
multicast packets	Targeted broadcast packets sent to a defined group.
Netboot	Bay Networks procedure for getting router startup files from a BOOTP server on the IP network.
node	On local area networks, a device that is connected to the network and is capable of communicating with other network devices.
packet	A unit of data sent across a network.

Ping	A program that is useful for testing and debugging networks. Ping sends an echo packet to the specified host and waits for a response. It then reports success or failure and statistics about its operation.
PPP	Point-to-Point Protocol, a protocol that provides a way of running IP over serial lines. It uses a variation of HDLC.
router	A device that connects two or more networks and can direct traffic based on network resource availability.
Site Manager	Bay Networks network management application. It is an SNMP-based graphical user interface used by network administrators to manage Bay Networks routers.
SNMP	Simple Network Management Protocol, a network management protocol on TCP/IP networks.
stack	A group of drivers that work together to span the layers in the network protocol hierarchy.
Telnet	Internet standard protocol for remote terminal connection service. Telnet is described in RFC 854.
Technician Interface	A software command-line interface, operating in router memory, that administrators use to manage Bay Networks routers.
TFTP	Trivial File Transfer Protocol. A protocol that enables file sharing over TCP/IP networks.
Windows	Microsoft Windows, the graphical user interface on which the router software runs.
WinSock	Windows Sockets. An application programming interface (API) support for IP environments.

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